

2 minute Warm-up!

1. $\log_4 16$ 2

2. $\log_4 64$ 3

3. $\log_3 9$ 2

4. $\log_3 \frac{1}{3}$ -1

5. $\log_2 32$ 5

6. $\log_2 4$ 2

7. $\log_5 \frac{1}{25}$ -2

8. $6^{\log_6 32}$ 32

9. $\log_4 x < 2$ $4^2 > x$
 $0 < x < 16$

10. $\log_2 x > 3$ $2^3 < x$ $x > 8$

$$a^2 - a - 6 > 0$$

$$(a-3)(a+2) > 0$$

-2, 3

$a < -2$
or
 $a > 3$

10-3 Properties of Logs

$$b > 0 \quad b \neq 1$$

$$m > 0 \quad n > 0$$

1. $\log_b m \cdot n = \log_b m + \log_b n$

2. $\log_b m/n = \log_b m - \log_b n$

3. $\log_b m^p = p \cdot \log_b m$

Simplify.

ex

$$2\log_{10} 5 + \log_{10} 4$$

$$\log_{10} 5^2 + \log_{10} 4$$

$$\log_{10} 25 + \log_{10} 4$$

$$\log_{10} 25 \cdot 4$$

$$\log_{10} 100$$

$$(2)$$

ex

$$2\log_3 6 - \log_3 4$$

$$\log_3 36 - \log_3 4$$

$$\log_3 \frac{36}{4}$$

$$\log_3 9$$

$$(2)$$

Hi Jack

ex

$$\log_4 40 - \log_4 5$$

$$\begin{aligned} \log_4 8 &= y \\ 4^y &= 8 \\ 2^{2y} &= 2^3 \\ \left(\frac{3}{2}\right) \end{aligned}$$

ex

$$\log_4 3 - \log_4 48$$

$$\begin{aligned} \log_4 \frac{1}{6} \\ -2 \end{aligned}$$

Expand

ex

$$\log_6 m^2 n^3$$

$$\begin{aligned} \log_6 m^2 + \log_6 n^3 \\ 2 \log_6 m + 3 \log_6 n \end{aligned}$$

Expand

ex

$$\log_4 \sqrt{\frac{m}{n^5}}$$

$$\begin{aligned} \log_4 \left(\frac{m}{n^5}\right)^{\frac{1}{2}} \\ \frac{1}{2} \log_4 \frac{m}{n^5} \\ \frac{1}{2} \log_4 m - \frac{1}{2} \log_4 n^5 \\ \frac{1}{2} \log_4 m - \frac{5}{2} \log_4 n \end{aligned}$$

Solve.

ex

$$\begin{aligned} \log_5 x &= 3 \log_5 2 + \log_5 7 \\ &\quad \log_5 8 + \log_5 7 \\ \log_5 x &= \log_5 56 \\ x &= 56 \end{aligned}$$

Solve.

ex

$$\begin{aligned} \log_3 x &= 2 \log_3 3 + \log_3 5 \\ 45 \end{aligned}$$

Solve.

ex

$$\log_b(x+3) = \log_b 8 - \log_b 2$$

$$x+3 = 4$$

$$x = 1$$

Solve.

ex

$$\log_7(x+1) + \log_7(x-5) = 1$$

$$\log_7[(x+1)(x-5)] = 1$$

$$\log_7(x^2 - 4x - 5) = 1$$

* Put it in exponential form

$$7^1 = x^2 - 4x - 5$$

$$0 = x^2 - 4x - 12$$

$$(x-6)(x+2)$$

$$x = 6, x = -2$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\log_3 54$$

$$\log_3 3^3 \cdot 2$$

$$\log_3 3^3 + \log_3 2$$

$$3 + 0.6310 \approx 3.6310$$

$$\begin{array}{c} 54 \\ \swarrow \searrow \\ 9 \quad 6 \\ \swarrow \searrow \swarrow \searrow \\ 3 \quad 3 \quad 3 \quad 2 \\ 3^3 \cdot 2 \end{array}$$

ex

$$\log_3 .25$$

$$\log_3 \frac{1}{4}$$

$$\log_3 2^{-2}$$

$$-2 \log_3 2$$

$$-2(0.6310)$$

$$-1.2620$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

$$\log_3 1 - \log_3 2^2$$

$$0 - 2(0.6310)$$

ex

$$\log_3 9/49$$

$$\log_3 9 - \log_3 49$$

$$2 - \log_3 7^2$$

$$2 - 2 \log_3 7$$

$$2 - 2(1.7712)$$

$$2 - 3.5424$$

$$-1.5424$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

$$\begin{array}{r} 1.7712 \\ \times 2 \\ \hline 3.5424 \end{array}$$

$$2.000$$

ex

$$\log_3 7/2$$

$$\begin{array}{r} 1.7712 \\ - 0.6310 \\ \hline 1.1402 \end{array}$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\log_3 18$$

$$\log_3 3^2 + \log_3 2$$

$$2 + .6310$$

$$2.6310$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\log_3 2/3$$

$$\log_3 2 - \log_3 3$$

$$.6310 - 1$$

$$-.3690$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

$$\begin{array}{r} 0.99 \\ 1.0000 \\ - .6310 \\ \hline .3690 \end{array}$$

HW

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